Express Mail Label No.: EL 993297084 US

SPECIFICATION

To All Whom It May Concern:

Be It Known That We, KENNETH SCHOBER, a citizen of the United States, resident of the City of Huntersville, State of North Carolina, whose post office address is 9706 Waterton Ct., Huntersville, North Carolina 28078; SCOTT HAMMONS, a citizen of the United States, resident of the City of Charlotte, State of North Carolina, whose post office address is 7619 Batavia Lane, Charlotte, North Carolina 28213; and JONATHAN PLACHE, a citizen of the United States, resident of the County of Surrey, United Kingdom, whose post office address is Charlcombe, Beech Hill, Brook, Surrey GU8 5LA, United Kingdom, have invented new and useful improvements in

INTERACTIVE LASER AMUSEMENT SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to provisional application Ser. No. 60/427,282 filed November 18, 2002, and which is incorporated herein by reference.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable.

BACKGROUND OF THE INVENTION

[0003] This invention relates to interactive target games, and, in particular, a target game utilizing light activated targets which are "shot" at using light emitting (laser-type) devices which are "charged" by participants engaging in an activity.

[0004] Targeting activities in which targets are impacted are well known. One common form of such targeting activities involves the use of soft balls (i.e., hollow plastic or foam balls) or water which are propelled at the target using a propulsion device. One such system is shown, for example, in Pat. No. 6,283,871 which is assigned to Koala Corporation of Denver, Colorado. Systems, such as disclosed in the noted Koala patent are enjoyed by the participants. However, such systems involve the use of shooting balls or water at targets or at participants. Even with soft balls and water, there is always the possibility of some sort of slight injury. Further, the balls can be lost and damaged, and thus must be replaced on a frequent basis. The use of water requires a complex and expensive drainage system. Additionally, the systems provided in the noted Koala patent do not provide for scoring. Hence, participants cannot compete against each other.

[0005] Targeting activities which avoid the use of such soft play articles and water are also known. For example, there are many different systems in which lasers or

laser-type devices (broadly, light emitting devices) and light activated targets are used. In such systems, a participant shoots his/her laser at the target, which can be either a stationary target, a moving target, or even a target worn by another player. However, such systems are generally not interactive, inasmuch as they simply require that the participants "shoot" their lasers at targets (whether the targets be mounted on some type of structure or on another participant).

BRIEF SUMMARY OF THE INVENTION

[0006] Briefly stated, a laser target system of the present invention includes at least one laser station and at least one light activated target. The laser station includes a laser (or light emitting device) and a "charging" apparatus. For the laser to be operable, the laser must be "charged up" by operating the "charging" apparatus, which requires that the participant engage in an activity. For example, and without limitation, the charging system can require that the participant use a hand or foot pump, operate a crank, run in place on pressure sensitive pads, use a "stair-stepper" type machine, use a "water-pump" type pump, use a rowing machine action, run or walk on a treadmill, spin a track ball, hit popped up blocks with a mallet, jump to press buttons, copy a light or sound pattern on a display, or "feed" balls into the light emitting device. Additionally, interactive video display units can be used to "charge" the light emitting device. Such video display units could require that the participant duplicate a particular pattern, answer multiple choice (or true/false) questions, or make other mental decisions.

[0007] When the light emitting device is charged, the participant shoots the laser at the targets, and the targets, when "hit" by light from the light emitting device,

produces an effect. The effect can be in the form of a light display, sounds, or activation or deactivation of other targets in the system. The system includes a controller for the targets and for the laser stations. The system can use a single controller, or a separate controller can be used for the targets and for the laser stations. The controller for the laser stations controls the number of shots which may be fired from the laser in response to the operation of the light emitting device and the operation of the charging apparatus.

[0008] The controller includes a detector which monitors the participants performance of the activity at the charging apparatus, and increments a shot counter based on the performance of the participant in the particular activity. When the light emitting device is fired, the shot counter is decremented by a predetermined amount for each shot fired. Additionally, the shot counter can be decremented by a negative charging activity (such as when a participant makes a mistake in performing an activity at a charging station) or a negative game activity (such as when a participant hit an inactive or "out-of-bounds" target). Hence, the light emitting device will eventually run out of shots, and will have to be "charged up" or "energized" again, by the participant performing the activity at the station. As noted, when the participant engages in the activity at the charging station associated with the light emitting device, the shot counter will be incremented in based on the participant's performance of the activity, enabling the light emitting device to be fired again. The light emitting device (or the charging station) includes a display controlled by the controller which indicates the status of the light emitting device. Such a status can include the number of shots remaining in the light emitting device, or some indication

of the relative number of shots remaining in the light emitting device. Such a status indicator can be by way of a video display unit, lights, etc.

[0009] The controller also controls the targets and activates and deactivate the targets. The activation and deactivation of targets can occur in a predetermined sequence, or various targets can be activated or deactivated when another target is hit. The targets are each provided with a point value. The system can be programmed such that the point values of the targets change in response to being hit or to other targets being hit. Preferably, the system includes a score indicator which displays the score of the participants. Such a score indicator can be associated with the light emitting devices themselves (or their associated charging stations) or can be a board centrally mounted in the attraction or on a wall in the attraction.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0010] FIG. 1A is a diagrammatic view of a laser target system of the present invention;

[0011] FIG. 1B is a diagrammatic view of a second configuration of the laser target system of the present invention incorporated into an overall play structure;

[0012] FIG. 1C is a block diagram of the electrical components of the laser target;

[0013] FIG. 2 is a perspective view of a laser station having a first physical activity for charging a laser device of the system;

[0014] FIG. 3 is a perspective view of a laser station having a second physical activity for charging a laser device of the system;

[0015] FIG. 4 is a perspective view of a laser station having a third physical activity for charging a laser device of the system;

[0016] FIG. 5 is a perspective view of a laser station having a fourth physical activity for charging a laser device of the system;

[0017] FIG. 6 is a perspective view of a laser station having a fifth physical activity for charging a laser device of the system;

[0018] FIG. 7 is a perspective view of a laser station having a sixth physical activity for charging a laser device of the system;

[0019] FIG. 8 is a perspective view of a laser station having a seventh physical activity for charging a laser device of the system;

[0020] FIG. 9 is a perspective view of a laser station having a eighth physical activity for charging a laser device of the system;

[0021] FIG. 10 is a perspective view of a laser station having a ninth physical activity for charging a laser device of the system;

[0022] FIG. 11 is a perspective view of a laser station having a tenth physical activity for charging a laser device of the system;

[0023] FIGS. 12a-c show a laser station having an eleventh physical activity for charging a laser device of the system;

[0024] FIG. 13 shows a laser station having a twelfth physical activity for charging a laser device of the system;

[0025] FIG. 14 is a perspective view of an laser target system incorporating the laser station of FIG. 13;

[0026] FIG. 15 is a schematic drawing showing the interconnection between light emitting devices and the ball distributor of FIGS. 13 and 14;

[0027] FIG. 16 is a perspective view of a laser station having a first skill activity for charging a laser device of the system;

[0028] FIG. 17 is a perspective view of a laser station having a second skill activity for charging a laser device of the system;

[0029] FIG. 18 is a perspective view of a laser station having a third skill activity for charging a laser device of the system;

[0030] FIG. 19 is a perspective view of a laser station having a fourth skill activity for charging a laser device of the system;

[0031] FIG. 20 is a perspective view of laser station having two charging activities associated with the station; and

[0032] FIG. 21 is a perspective view of another laser station having two charging activities associated with the station.

[0033] Corresponding reference numerals will be used throughout the several figures of the drawings.

DETAILED DESCRIPTION OF THE INVENTION

[0034] The following detailed description illustrates the invention by way of example and not by way of limitation. This description will clearly enable one skilled in the art to make and use the invention, and describes several embodiments, adaptations, variations, alternatives and uses of the invention, including what we presently believe is the best mode of carrying out the invention. Additionally, it is to be understood that the invention is not limited in its application to the details of construction and the arrangements of components set forth in the following description or illustrated in the drawings. The invention is capable of other

embodiments and of being practiced or being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting.

[0035] An illustrative embodiment of an interactive laser target activity system S of the present invention is shown diagrammatically in FIGS. 1A and 1B, and in block diagram form in FIG. 1C. The system S can be a stand-alone system, as shown in FIG. 1A, or incorporated into a larger play area P as shown in FIG. 1B. Such a play area can include climbing units, slides, ball pits, tunnels, etc. The system S includes a plurality of laser stations LS and a plurality of light activated targets T which are positioned around a structure or area 10. Each laser station LS includes a light emitting or laser-type device L and an associated charging apparatus C. The light emitting devices L can be any type of light emitting device which, upon activation, emits a beam of coherent light. The device L can, for example, emit a low powered laser beam, an infra-red (IR) beam, or an equivalent type of low-powered energy beam which can be detected by the targets T. The laser stations LS are positioned around the activity area. The light emitting devices L are mounted on their respective laser stations LS so that the light emitting devices L can be pivoted up and down and rotated. The laser stations and associated light emitting devices can be shaped and configured to have any desired appearance. For excitement for children, preferably, the light emitting devices have the appearance of a laser weapon, such as depicted in various figures. The targets T are also positioned around the area 10. Additional targets can be worn by individual participants. As can be appreciated, the light emitting devices are activated (for example, by pressing a button or pulling a trigger)

to shoot a light beam at the targets (whether the targets be on an individual or on a wall of the activity area). When a target is "hit", preferably there will be a response. For example there might be a sound associated with the target being hit, or a light display may be activated. The targets may be activated and deactivated in response to the targets being hit. Hence hitting one target can result in the activation or deactivation of other targets. As discussed below, the system S monitors the participants score, and thus includes a scoreboard SB (FIG. 1C). Each target is assigned a value, and the score is at least partially based on the value of the targets hit. In response to the targets being hit, the score can change. Preferably, the various targets will have different responses to being hit to provide more excitement to the participants.

[0036] With reference to FIG. 1C, the system S includes a controller 5 to which the targets T and laser stations LS are operatively connected and controlled. Each laser station LS includes a shot counter (which tracks or monitors the number of shots allotted to each laser station LS at a particular time). The number of shots, as described below, is incremented by operation of the charging apparatus C and decremented by operation of the laser. Additionally, the shot counter can be decremented by a negative event, such as hitting a deactivated or "off limits" target, or by poor performance at the charging apparatus C, as will be discussed below. The participant's performance or operation of the charging apparatus C is monitored by a sensor or detector D. The detector D sends a signal to the controller 5 each time a charging activity is performed. The detector signal will be indicative of the amount the shot counter for the laser station should be incremented (or

decremented). Additionally, the light emitting device sends a signal to the controller 5 each time it is activated or shot. The light emitting device signal is indicative of the amount by which the shot counter for the particular laser station should be decremented. The controller sends signals to the laser station to operate light displays, video displays, etc. that are associated with the laser station LS. The targets T, as noted above, are light activated. The targets each send a signal to the controller 5 when hit by an energy wave (i.e., light beam) from the light emitting device L. The signal from the target will be indicative of which laser station LS the beam came from. The controller includes in a memory, the point value associate with each target, and, in response to the signal from the target, will update the score board SB to indicate the score for the particular laser station LS. Additionally, in response to the signal from the target, the controller 5 will activate the target hit response – that is, it will activate a light display or speaker associated with the target to make a visual or aural response. Alternatively, the controller can deactivate the target hit (so that when hit again, no points are scored, or negative points are scored), or other targets can be activate or deactivated. Additionally, in response to the signal from the target, the controller can change the point value associated with the particular target and/or change the point value associated with other targets of the system. If targets are activated and deactivated by the controller 5 in response to targets being hit, the controller preferably will provide some type of visual indication that a target is either inactive or active (i.e., lights associated with the target can be turned on or off, as appropriate).

[0037] One example of a light-emitting device L is shown in FIG. 2. The light-emitting device L of FIG. 2 has a body 2 mounted on a post 4. A tube 6 extends from the body 2, and is designed to look like the barrel of a laser weapon. The light emitting device L can include lights 7 and 8 on the body and lights 9 on the post 4. The lights 8 and 9 are light strips, or lights contained in tubes, and actually include a plurality of lights that are lit in a pattern or in a random order. As can be appreciated, the lights 7, 8 and 9 on the light emitting device are provided to enhance a participant's time when playing in the play area.

[0038] The important aspect of the system is that the participants are required to "charge up" or "energize" the light emitting devices L by engaging in either a physical or a skill activity. There is a charging apparatus C associated with each light emitting device L. In some instances, as will become clear below, the charging apparatus C is adjacent the light emitting device L, in some instances, the light emitting device is mounted on the charging apparatus, and in other instances, the charging apparatus is incorporated in the light emitting device. Each charging apparatus C requires that the participant engage in an activity, which can be either a physical activity, a skill activity, or a mental activity. As noted above, a sensor or detector D is provided as part of each laser station LS to monitors the participant's activity at the charging apparatus. The controller 5 increments the shot count for the laser station LS based on the performance of the participant at the activity of the charging apparatus C. The longer a participant engages in a particular physical activity or the better a participant performs in a particular skill or mental activity, the greater the "charge" will be to the light emitting device, and the more shots the participant will be able to take. The

controller can also operate the laser station LS such that in the occurrence of a negative event (i.e., the participant makes a mistake during a charging activity) the shot counter is not incremented, but rather is decremented (or at least not incremented).

[0039] The controller 5 also monitors the number of shots fired by the light emitting device. Each time a participant fires the light emitting device, for example, by pulling a trigger, pressing a button, etc., the light emitting device signals the controller that a shot has been fired. The controller keeps track of the number of shots fired, and decrements the number of shots that can be fired from the light emitting device by a predetermined amount each time the light emitting device is fired. The amount the by which the shot counter is decremented can vary between the various light emitting devices within an installation. Eventually, the participant will deplete the "shots" in the light emitting device by "shooting" the light emitting device, and will have to "charge up" the light emitting device again.

[0040] The controller 5 also controls any visual display, such as the lights 7, 8, and 9, on the laser station LS. The lights (or visual display) can be controlled to be flashed on and off in a predetermined pattern or in a random fashion during "charging" of the light emitting device. Additionally, the controller can control the lights 7, 8 and 9 to flash them in a different pattern while the light emitting device is being fired. Further, the lights 7, 8, and 9 can be used to indicate the number of "shots" left in the light emitting device. For example, when the light emitting device is "fully charged", the light tube 8 can be fully lit. During firing of the light emitting device, the lights in the light tube 8 can be deactivated, and when all the lights in the

light tube are deactivated, the light emitting device will have no more shots, and must be recharged. During charging, the lights in the light tube will again be reactivated in order to indicate the amount of "charge" in the light emitting device L. The status of the "charge" or amount of shots remaining in the light emitting device L can also be shown on a video display unit (VDU). The VDU can show an absolute number of shots remaining. Alternatively, the VDU display a gage which will show an approximation of the number of shots remaining.

[0041] FIGS. 2-21 show a number of different alternative activities in which the participants engage at the various charging apparatus. Although the number of examples provided is fairly extensive, the list of activities is not intended to be exhaustive. The number or types of activities in which the participant can be required to perform are limited only by the imagination and the ability to provide a detector which can monitor the performance of the activity.

[0042] FIG. 2 shows a laser station LS with a light emitting device L and one embodiment of an associated charging apparatus C1 adjacent the light emitting device L. The charging apparatus C1 is in the form of a hand pump having a base 12 and an extendable/retractable rod 14. The rod is pulled up and pushed down by a participant. The controller 5, using the detector D, keeps track of the number of times the rod is extended or retracted, or keeps track of the duration of pumping at the charging apparatus C1. The detector D is incorporated in the base 12, and can comprise, for example, a switch which is activated each time the rod 12 is pushed into the base. Each time a participant pumps the charger, the controller will add, for example five more shots which can be fired from the light emitting device L. Hence,

the longer the participant engages in the pumping activity, the more shots the participant will earn. Additionally, participants can work in teams – one participant can continue to charge up the light emitting device L and the other can aim and shoot the light emitting device L. Then, when the charging participant tires, they can switch.

[0043] A second embodiment of the charging apparatus C2 is shown in FIG. 3. The charging apparatus C2 is similar to the charging apparatus C1. However, it is in the form of a foot pump, rather than a hand pump. The charging apparatus C2 includes a base 16 and a pedal 18 which is mounted to the base 16 at one end of the pedal, and the pedal can be moved between a raised and a lowered position. A rod 19 depends from the bottom of the pedal 18 near the free end of the pedal and extends into the base 16. The rod 19, and hence the pedal 18, is spring biased to an upward position. The detector D monitors the number of times the pedal is depressed. As in the charging apparatus C1, the detector D of the charging apparatus C2 can be a switch which is activated each time rod 19 is pushed into the base. Alternatively, the rod 19 can be replaced with a spring on the upper surface of the base 16. In this instance, the detector D can comprise a switch on the upper surface of the base and which contacted (and activated) by the foot pedal when the foot pedal is depressed. The controller 5 monitors the number of times the foot pedal is depressed, and each time the pedal is depressed, the controller increases the number of shots that can be fired from the light emitting device by a predetermined amount. Hence, the longer the participant operates the foot pedal 16, the greater number of shots the participant will be able to take with the light emitting device.

[0044] FIGS. 4 and 5 show two embodiments of the charging apparatus which utilize cranks adjacent their respective light emitting devices to "charge up" the light emitting device. The crank charging apparatus C3 of FIG. 4 includes a pair of opposed crank shafts 20 mounted on a pedestal or base 22. The crank shafts 20 extend from a rotatable cylinder 24 which is mounted for rotation on the pedestal by a sleeve 26 housing a bearing assembly. As can be appreciated, using the crank shafts 20, the participant will rotate the cylinder 24 within the sleeve 26. The detector D is housed in the pedestal 22 or sleeve 26 to monitor the number of times the cylinder makes a complete rotation as the participant rotates it using the crank shafts 20. Each time the cylinder 24 completes a rotation, the controller increases the number of shots that can be fired from the light emitting device by a predetermined amount. The charging apparatus C3 can include lights 25 and/or 27 on the base 22 and sleeve 26, respectively. The controller can activate the lights 25 and 27, such that they light up while the participant operates the cranks 20.

[0045] The crank charging apparatus C4 of FIG. 5 includes wheel or disk 26 rotatably mounted on a surface 28 such as a wall near the light emitting device L. The disk 26 is rotated by a handle 30 on the disk. The detector D is activated each time the disk makes a complete revolution; and each time the disk 25 completes a revolution, the controller increases the number of shots that can be fired from the light emitting device by a predetermined amount. The disk 26 can provided with designs which are pleasing to the eye, both when the disk is stationary and when it is being rotated.

[0046] The embodiments of the charging apparatuses shown in FIGS. 6 and 7 both involve stepping activities. The charging apparatus C5 of FIG. 6 includes a pair of footprints 30 on the floor adjacent the light emitting device L. The footprints 30 include a membrane on which the user steps, as seen in the Figure. The detector D is positioned below the membrane, in the form of a pressure sensitive switch, which is activated each time the user steps on the membrane. Thus, each time the participant steps on the membrane, he/she activates the detector D, and the controller increments the shot count for the laser station, increasing the number of shots that can be fired from the light emitting device by a predetermined amount.

[0047] The charging apparatus C6 of FIG. 7 is in the form of a stepper device. Unlike the charging apparatuses C1-C5, which are spaced slightly from the light emitting device L, The light emitting device L is mounted on the charging apparatus C6. As seen, the light emitting device L is mounted on a post 33 which extends up from a base 34 of the charging apparatus C6. The charging apparatus C6 includes a pair of pedals or stepper arms 32 on which the participant stands. The stepper arms 32 extend from the base 34 and are mounted in the base to be pivotal about an axis between a raised and a lowered position. The stepper arms 32 are biased to their raised positions. The participant can then press down on the stepper arms 32 to simulate stair climbing, as is known. The detector D is positioned in the base to monitor the number of times the stepper arms 32 are pressed down (i.e., to monitor the number of steps the participant takes). Each time the user depresses one (or both) of the stepper arms, the detector D will be activated to send a signal to the

controller, and the controller will increase the number of shots that can be fired from the light emitting device L by a predetermined amount.

[0048] The embodiment of the charging apparatus C7 shown in FIG. 8 is in the form of a well pump, and includes a cantilevered arm 36 mounted in a base 38 to be pivotal about a point between the ends of the arm. A rod 40 (such as a piston rod) is mounted to one end of the arm 36, and, as the arm 36 is pivoted, the rod 40 will be raised and lowered relative to the base 38. The detector D is positioned in the base 38 to monitor the number of times the rod 40 is raised and lowered (and hence, the number of times the participant pumps the arm 36). Each time the participant pumps the arm 36, the detector will be activated to send a signal to the controller, and the controller will increase the number of shots that can be fired from the light emitting device L by a predetermined amount.

[0049] The embodiment of the charging apparatus C8 shown in FIG. 9 includes a base 42. The light emitting device L is mounted on a post 43 which extends up from the base 42. A pair of arms 44 extend upwardly from the base on opposite sides of the light emitting device L. The arms 44 are mounted in the base 42 to be pivotal about a point within the base. The arms 44, as seen in FIG. 9, are moved back and forth, to simulate a rowing motion (or the arm motion of cross-country skiing). The detector monitors the number of times the participant moves the arms 44 back and forth. Each time the participant moves the arms 44 back and forth, the detector is activated to send a signal to the controller, and the controller increases the number of shots that can be fired from the light emitting device by a predetermined amount.

[0050] The embodiment of the charging apparatus C9 shown in FIG. 10 is in the form of a treadmill 48. The treadmill includes a handle 50 to which the participant can hold while operating the treadmill 48. The light emitting device is mounted on a post 51 which extends up from the handle 50. The detector D is housed within the treadmill 48 and is of the type that can monitor the duration the participant operates the treadmill or the effective distance run or walked by the participant on the treadmill. The detector is activated each time a predetermined time interval is met (i.e., every 10 seconds) or every time a predetermine distance (i.e., 100 yards) is reached to send a signal to the controller, and the controller increases the number of shots that can be taken with the light emitting device by a predetermined amount.

[0051] The embodiment of the charging apparatus C10 shown in FIG. 11 includes a ball 52 mounted in the top of a base 54 to be rotatable about an axis. The ball 52 can be mounted to be rotatable only about a single axis (in which case, the base includes an axle extending through the ball - preferable on a diameter of the ball). Alternatively, the ball can be mounted in the charging system base to be rotatable in any direction (i.e., forward and backward, side-to-side, diagonally, etc). In the instance in which the ball is rotatable about a single axis, the detector D monitors the number of revolutions made by the ball as the participant spins the ball. The detector is activated each time the ball completes a revolution to send a signal to the controller. The controller increases the shots that can be fired from the light emitting device L by a predetermined number of shots for each revolution (or set of revolutions) of the ball 52. In the instance where the ball 52 can be rotated in any direction, the detector can monitor the effective distance the ball is rolled, and

controller increases the number of shots that can be fired from the light emitting device L based on the effective distance the can be earned based on the ball 52 is rolled.

[0052] The embodiments of the charging apparatuses C11 and C12 shown in FIGS. 12A-C and 13 show charging apparatus in which balls enter or pass through the light emitting device L. Unlike the charging apparatuses C1-C10 which were separate from the light emitting devices, the charging apparatuses C11 and C12 are incorporated into light emitting devices L. In FIGS. 12A-C, the charging apparatus C11 includes a body 54 having a clear tube 56 which communicates with a cavity 58 in the light emitting device body 54. The tube 56 and cavity 58 are both sized to hold balls 60. The body 54 preferably has windows 62 so that the balls in the cavity can be seen. Additionally, the charging system C11 includes a lever 64 moveable between a forward position (as in FIG. 12A) and a rearward position (as in FIG. 12B). When the lever 64 is pulled from its forward to its rearward position, a ball 60 is moved from the cavity 58 to the tube 56. The detector D is mounted in the body 54, and can be activated either by the pulling of the lever 64 rearwardly, or by the ball 60 passing over the detector. Each time the detector is activated, it sends a signal to the controller, and the controller 5 increments the shot counter for the light emitting device with a predetermined number of shots.

[0053] When the lever 64 is pulled back, the detector signals to the controller that the lever 64 has been pulled, and the controller activates a mechanical moving system within the body 54 which moves the ball 60 from the cavity 58 to the tube when the lever is pulled. The mechanical moving system which moves the balls 60

between the cavity 58 and the tube 56 can be any number of desired systems. For example, it can include a paddle wheel positioned at the junction between the cavity and tube. The paddle wheel is moved by a reversible stepper motor which rotates the paddle wheel. Thus, when the lever 64 is pulled the stepper motor is activate to rotate the paddle wheel incrementally to move a ball 60 from the cavity 58 to the tube 58. Conversely, when the light emitting device is activated (i.e., fired) a predetermined number of time, the stepper motor is activated in the opposite direction to rotate paddle wheel incrementally to move a ball 60 from the tube 58 to the cavity 58. Other moving mechanisms can include solenoid actuated rods. The rods would be activated in response to pulling of the lever to move a ball 60 from the cavity 58 to the tube 58 and in response to activation of the light emitting device to move a ball 60 from the tube 58 to the cavity 58. This would include two actuators, one to move balls from the tube to the cavity and a second to move the balls from the cavity to the tube.

[0054] FIGS. 12A-C demonstrate the operation of the light emitting device with the charging apparatus C11. Initially, the light emitting device is shown in FIG. 12A in a discharged state, with all the balls 60 in the cavity 58. The participant charges the light emitting device by pulling the lever 64. Each time the lever is pulled one of the balls is moved from the cavity 58 into the tube 60, and the light emitting device is charged with a predetermined number of shots (i.e., five) for each ball moved from the cavity to the tube. In FIG. 12B, the light emitting device is shown with all the balls in the tube. As the user fires the light emitting device, the balls drop back from the tube to the cavity, as seen in FIG. 12C. Thus, for example, if each ball is worth five

shots, for each five shots taken, a ball passes back into the cavity. The controller monitors the number of shots taken so that the ball moving system is activated at the proper times to move balls from the tube to the cavity. When all the balls are returned to the cavity, the light emitting device will be "fully discharged" and at least some of the balls will have to be moved back into the tube 56 by operation of the lever 64 before the light emitting device can be fired again. As can be appreciated, the charging apparatus C11 is fully contained. The balls are visible, but they are not removed from the light emitting device L.

[0055] In an alternative embodiment to the laser station of FIGS. 12a-c, the balls could be loose, and could be introduced into the cavity by the participant. In this instance, the light emitting device L would be provided with a loading mechanism. For example, it could include a breach loader which is opened by moving the lever 64 forward. The participant could then place a ball in the loader, and, by pulling the lever 64 rearwardly, close the loader and activate the ball moving system to move the ball into the tube 56. Conversely, when the light emitting device is activated, the ball moving system can expel the balls from the light emitting device through, for example, a port in the bottom of the body 54.

[0056] The embodiment of the charging apparatus C12 shown in FIG. 13 is similar to the charging apparatus C11 of FIG. 12. However, rather than feeding balls into a cavity within the body of the light emitting device L, balls 60 are passed through the body 68 of the light emitting device L. The charging apparatus C12 includes a clear entry tube 66a and an clear exit tube 66b which enter and exits the body 68 of the light emitting device L. The tube on the entry side is maintained with balls. The body

68 includes a lever 70 which is moveable between a forward position and a rearward position. When the lever 70 is moved from its normally forward position, to the rearward position, it enables a ball to pass through the body 68 from the entry tube 66a to the exit tube 66b. As with the charging system C11, the detector D of the charging system C12 can be activated either by the ball 60 passing over the detector, or by the action of pulling the lever 70 back. Each time the detector D is activated, the detector sends a signal to the controller to increase the number of shots that can be fired from the light emitting device L by a predetermined number (i.e., five) of shots. The light emitting device L can include a charge indicator 72 which can be in the form of lights, a dial, a bar graph, video display unit, etc. which will give some indication of either the number of shots that can be taken with the light emitting device, or the extent of the charge (i.e., fully charged) so that the participant can determine if he/she has a lot or only a few shots left before the lever will again have to be operated to further charge the light emitting device.

[0057] FIG. 14 shows an embodiment of a laser target system S comprised of several laser stations LS each of which incorporates the charging apparatus C12. The system is shown in FIG. 15 is block diagram form. The system S also includes a ball distributor 74 (FIG. 14) which is operatively connected to all the light emitting devices incorporating the charging system C12 by means of ball transport tubes 66a,b. The laser station exit tube 66b is directed to a main ball hopper 80 into which the balls 60 are deposited. Preferably, the tubes 66b each include a funnel or discharge end 82 spaced slightly from the hopper 80, and the balls 60 are forced from the discharge end 82 of the delivery tube 78 and into the ball hopper 80. The

ball hopper 80, in turn, is in communication with the entry tubes 66a to deliver the balls back to the laser station LS. In a preferred embodiment, the ball transport tubes 66a,b are all clear and positioned in the activity room to be visible. This will allow participants to view the balls 60 passing through the tubes as they are moved between the ball distributor and the associated light emitting devices. The balls 60 are forced through the ball transport tubes either by means of positive pressure or by vacuum. Preferably, the system includes a blower B (FIG. 15) which creates a positive pressure in the ball transport tubes that communicate with the input tubes 66a of the associated light emitting devices. Additionally, the system can include pumps P which create a vacuum in the exit tube 66b at the light emitting devices L to pull the ball away from the light emitting device, and which introduces a positive pressure which will move the balls to the ball distributor. This is shown schematically in FIG. 15. In operation, when the lever 70 is pulled, a port within the body 68 is opened, and the positive pressure in the delivery or entry tube 66a and the vacuum in the exit tube 66b pushes and pulls on the ball 60 to move the ball through the body 68 from the entry tube 66a to the exit tube 66b.

[0058] The embodiments of the charging systems noted above require the participant to engage in a physical activity, such as pumping, stepping, cranking, rowing, walking or running, and lever pulling. These charging systems all award fast action. That is, the faster the particular activity is performed, the quicker the light emitting device will be charged. Additionally, fast action will allow for greater charging of the light emitting device in a shorter period of time. The following activities are all skill activities. In those activities, the participants are awarded for

their performance (i.e., how well they perform the various activities). While fast action may enable quicker charging of the light emitting device in these following activities, this faster charging will only be coupled with proper performance. Thus, if an activity is not properly performed, the participant will not earn any shots for his/her light emitting device.

[0059] The embodiment of the charging apparatus C13 shown in FIG. 16 includes a base 90 adjacent a light emitting device L. A plurality of pegs 92 are mounted in the top surface of the base for reciprocal motion between a raised and a lowered position. The pegs 92 are, for example, operatively connected to solenoids – there being a solenoid for each peg 92. The solenoids are operated by the controller to raise the pegs from the lowered position to their raised position in a predetermined or random manner. The participant then uses a mallet 94 to hammer the raised pegs 92 to their lowered position. The detector D is activated when the pegs 92 are lowered by the participant hitting them with the mallet 94. As the pegs are lowered, and as the detector D is activated, as described below, the controller increases the number of shots that can be taken with the light emitting device L. In one version, the solenoids can raise the pegs one at a time, and a new peg is not raised until a currently raised peg is lowered. In this case, each time a peg returned to the lowered position, the controller increments the number of shots that can be taken at the associated light emitting device. This charging system awards the participant's speed in hitting the pegs back to their lowered position. In another version, the several of the pegs are raised in a particular order, and the participant must then lower the pegs in the same order in which they were raised. In this instance, the

controller increments the number of shots that can be taken for each peg that is returned to its lowered position in the correct order. Hence, if five pegs were raised in a certain order, and the participant returned three of the five pegs in the proper order, the controller would only increment the shot count for those three pegs. The shot count would not be incremented for the two pegs hit in the incorrect order. Additionally, a buzzer could be sounded when a peg is hit out of order. Further, the participant could be penalized shots (i.e., the shot counter could be decremented by a predetermined about) or his/her score could be reduced if a peg is hit out of order. The number of shots awarded can vary with the complexity of the pattern. For example, if the pattern included three pegs, the participant may be awarded two shots for each peg correctly returned to the lowered position. However, if the pattern included five pegs, the participant my be awarded five shots for each peg correctly returned to the lowered position.

[0060] The embodiment of the charging apparatus C14 shown in FIG. 17 involves jumping. The system C17 includes a plurality of buttons 100a-e which are positioned on a wall or panel 101, preferably in a vertical row. Further, the buttons 100a-e vary in size, with the lowest button 100a being the largest and the top button 100e being the smallest. The system C14 requires that the participant press the buttons. Each time a button is pressed, the detector D will be activated, and the controller will increment the shot count for the light emitting device with a predetermined number of shots. Preferably, the higher and smaller buttons have greater values. Thus, if the participant presses the button 100e, the controller will increment the shot count with more shots than if the participant presses the button 100a. The number of shots the

unit is incremented by increases with each button. Hence, for example, button 100a may be worth one shot, button 100b may be worth two shots, button 100c may be worth three shots, button 100d may be worth 4 shots, and button 100e may be worth five shots. The value of the buttons 100a-e can be varied as desired. Further, there can be more (or fewer buttons) and the buttons can be arranged diagonally or horizontally. However, a horizontal arrangement will make hitting the smaller buttons significantly easier, depending on the height of the buttons relative to the participant.

[0061] The embodiment of the charging apparatus C15 shown in FIG. 18 includes a body or base 110 having a upper surface 112 which is shown to be sloped. A plurality of colored buttons 114 are provided in the top surface. The buttons 114, in combination, form a circle. The buttons 114 could, in combination, form any other desired shape. The buttons 114 are each a different color, and each button includes a light, so that the buttons can be lit up. The lights of the individual buttons are operatively connected to the controller 5 which lights the buttons in a random order. The participant then has to press the buttons 114 in the same order in which they were lighted. The pressing of the buttons 114 activates the detector D. In this instance, the detector D would actually comprise a plurality of switches, there being a switch for each of the buttons 114. The controller monitors the order in which the buttons are pressed based on the output from the detector, and compares the order in which the participant presses the buttons to the order in which the buttons were lit. The controller increments the shot count for the associated light emitting device L with a predetermined number of shots for each button pressed in the correct order.

The participant is notified if he/she presses a button out of order. For example, a buzzer can be sounded, or the lights of all the buttons can flash, or all the button lights can be extinguished. Further, the participant could be penalized shots (i.e., the shot counter could be decremented by a predetermined about) or his/her score could be reduced if a peg is hit out of order. After a participant completes a pattern (whether correctly or incorrectly) the charging apparatus C15 will then provide a new pattern for the participant to try and copy. The number of shots the shot counter of the light emitting device is incremented by can vary with the complexity of the pattern. For example, if the pattern includes three buttons, the shot counter can be increased by two shots for each button correctly pressed. However, if the pattern included five buttons (which, in the FIG. would require pressing one of the buttons twice), the shot counter could be incremented by five shots for each button correctly pressed. Additionally, different sounds can be associated with each button. Hence, when the buttons are lit in a certain pattern (and pressed in the same pattern) the buttons will produce a sound pattern, which could mimic a melody.

[0062] The embodiment of the charging apparatus C16 shown in FIG. 19 is substantially similar to the charging apparatus C15 of FIG. 18. However, rather than having flat buttons formed in a circular patterns, the buttons 114' are in the form of a semicircle and are raised relative to the surface 112' of the base 110'.

[0063] The embodiment of the laser station LS shown in FIG. 20 includes two additional embodiments of the charging apparatus, C17 and C17', both of which are in the form of steering wheels 120 which are spun or rotated by a participant. The detector of the charging apparatus is activated to send a signal to the controller to

increase the shot count each time one of the steering wheels 120 completes a revolution. As seen, the two steering wheels 120 are close together. Hence, a participant can spin both steering wheels at once to more quickly increase the shout count for the laser station. The base or console 122 of the laser station is shown in more detail. Near its top, the laser station control includes a video display 124, a speaker 126, and a set of buttons 128. The video display 124 can display the participant's score achieved in shooting at targets, as will be explained below. It can also display the number of shots that can be fired with the light emitting device L before it needs to be "recharged" or "energized". The video display 122 can also be operated, when in an idle mode (i.e., not in use) to display high scores and/or animation or other types of visual displays to attract participants. The speaker 126 can be used to broadcast instructions or play music when the laser station is in an idle mode. When the laser station is in use, the speaker can be used to play sound effects produced when various of the targets T are hit. The buttons 128 can be provided as another charging apparatus. Alternatively, they can simply be buttons that are lit up to produce a visual display. Below the video display 124, the console 120 includes a coin acceptor 130. As is common, the participant will deposit coins of a predetermined amount (i.e. 50¢) to initiate use of the laser station LS. A ticket dispenser 132 can also be provided to dispense tickets 134. The number of tickets dispensed from the ticket dispenser would be based upon the score the participant achieved during use of the laser station LS.

[0064] The embodiment of the laser station LS in FIG. 21 is shown to include two different types of charging apparatuses. It includes the charging apparatus C7' which

is similar to, and operates in substantially the same way as, the charging apparatus C7 (FIG. 8). It also includes the charging apparatus C12 (FIG. 13) which passes balls 60 through the body of the light emitting device L. The laser station LS also includes a console 122 as described just above.

[0065] In operation, when one of the laser stations LS of the system is not in use, the laser station is in idle mode. While one laser station is in idle mode, other laser stations of the system can be in use. The laser station is placed in idle mode after a predetermined period of non-use of one of the light emitting devices. As noted above, the light emitting device and the charging apparatus both send signals to the controller. The controller monitors the time between signals from the light emitting device and the charging apparatus. If the controller has not received a signal, for example, for one minute, from either the controller or the charging apparatus, the controller will sense the lack of activity, and launch the particular laser station into an idle routine. While in the idle routine, daily high scores can be displayed. Additionally, animations and video can be displayed on the video display and music and sounds can be played over the speaker. The purpose of this phase is to induce players to participate and educate potential participants as to the game play concepts and celebrate previous players success.

[0066] The participant activates the laser station, for example, by depositing coins in the coin acceptor 130. Alternatively, if coins are not required, the laser station can be activated (i.e. launched into a game playing mode) simply by operation of either the light emitting device L or the charging apparatus C. During play (i.e., when a participant operates one of the light emitting devices) the laser station will launch into

a game mode, and continue in that mode until the participant either stops using the device, or the allotted time for use of the device expires. During the game mode, the controller will activate the targets, determine which targets are hit by the particular player, and keep track of the players score, based on the score value of each target hit. The controller can also keep track of the number of shots fired and/or the number of shots with which the light emitting device is charged. In this way, the device can also display a relative score-to-shot ratio.

[0067] The embodiments of the laser station shown in FIGS. 2-19 include only one charging apparatus. The embodiments of the laser station shown in FIGS. 20 and 21, on the other hand have multiple charging apparatuses for a single light emitting device. The use of multiple charging apparatuses allows participants to help keep a light emitting device charged and to improve their collective score. Each charging apparatus associated with the light emitting device can have a weighted or handicap valuation which drives the level of shot activations applicable to the specific type of work an activity generates.

[0068] The scoring of performance at the charging apparatus can be separated from the scoring of shooting. For the scoring of the charging apparatus, the charging activity is logged and scored against time. For example, with respect to the charging apparatus C1 (FIG. 2), the controller determines the number of times the pump handle was extended and retracted and the time in which it took to accomplish this to produce a time weighted score. Alternatively, a raw charging score, which corresponds to the number of times the charging apparatus was pumped (with reference to FIG. 2), can be displayed. The charging activity score is then viewed by

participants both in isolation as a "loading score" for the particular laser station, and integrated with score of the associated light emitting device.

[0069] The light emitting devices (or shooters) receive a score based upon their successful hitting of targets which yield a positive result. The score can be based on time if desired (i.e., X points in Y minutes). Some targets yield negative events and reduce a participant's score. The light emitter's (or shooter's) score is viewed by participants both in isolation as a "blaster" or "shooter" score and integrated with the score from the associated charging apparatus.

[0070] The score at the charging apparatus and light emitting devices (i.e., the loading score and the blaster score) can also be combined to produce a collective or team score. The allows for a group of participants to compete with another group of participants over a period of time. In this case, the group would comprise a participant who operates a light emitting device L of the laser station, and a participant who operates the charging apparatus at the same laser station. In the case of a solo participant operating both the charging apparatus and the light emitter, the solo participant would receive a collective score.

[0071] Lastly, the targets are in communication with the controller, and can be sequenced on and off with illuminated patterns and special effects to denote the relative value and/or penalty when shot by a light emitting device. When hit, the targets can generate a light effect, a sound effect, or trigger special effects to denote success or failure. In addition, the targets send a signal to the controller to increase the "blaster" score for the particular laser station which hit the target and the respective team working at the device. Further, hitting targets in an incorrect order or

those deemed negative by way of color, pattern, or the like, can cause the light emitting device to loose some or all of its current shots, thereby causing the participants of that specific light emitting device to work harder. Alternatively, hitting targets in an incorrect order to those deemed negative can result in a negative scoring event – in that the blaster score for the particular laser station will be reduced by a predetermined amount.

[0072] As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. For example, although the charging systems C1-C12 are described to monitor the number of times an activity (such as pumping, stepping, etc.) is performed, the controller, using the detector D, could instead monitor the duration the activity is engaged in by the participant. Although the system is described generally that the shot counter is incremented a predetermined amount each time the laser station detector is activated, the shot counter could instead be incremented, for example, for every five activations of the detector. This may be used, for example, in the charging apparatus which involve simple activities, such as the rotation of a wheel. These examples are merely illustrative.